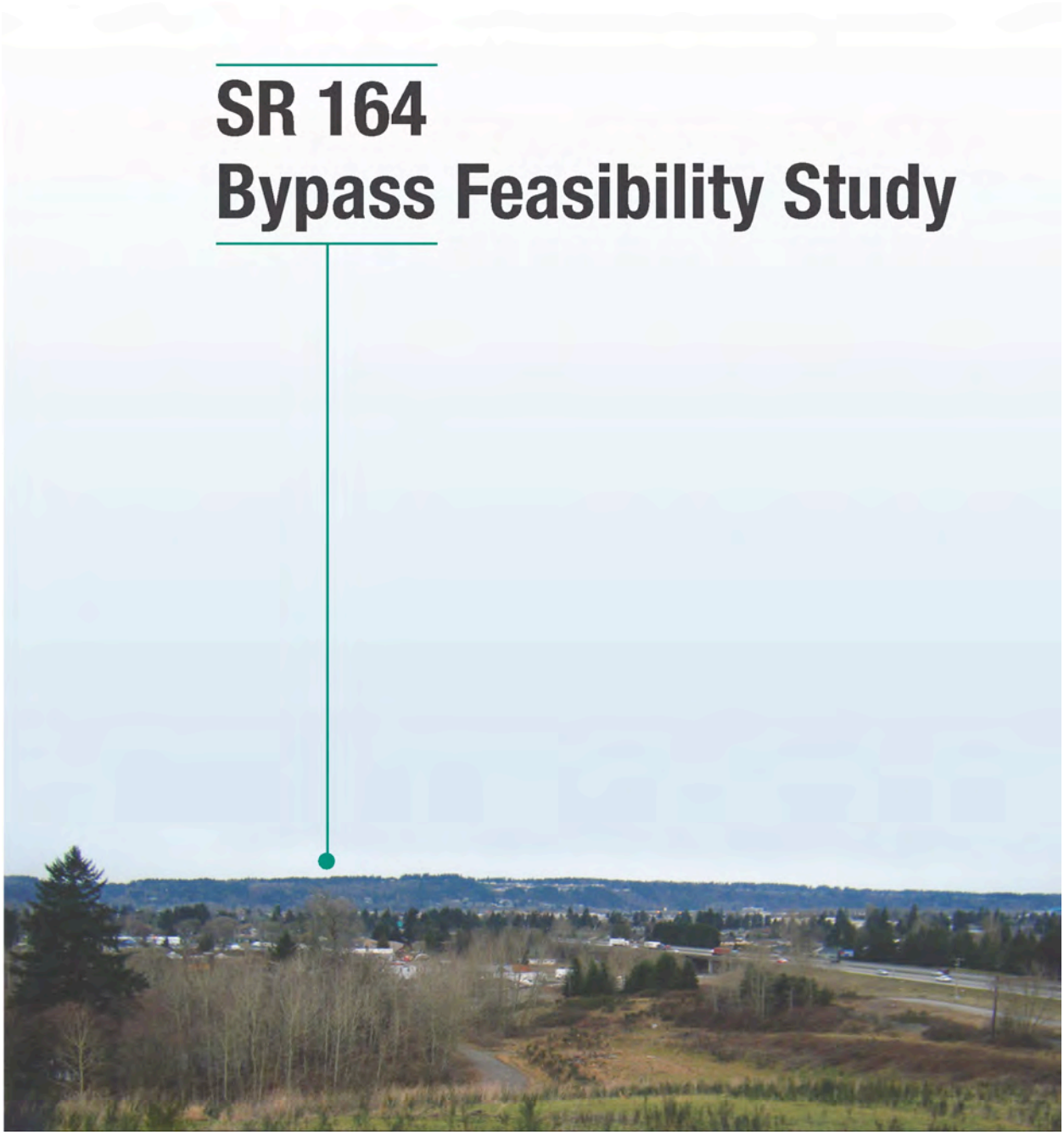
Washington State Department of Transportation

Strategic Planning and Programming Division
Urban Planning Office

SR 164 Bypass Feasibility Study



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Washington State
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Washington State Department of Transportation
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SR 164 Bypass Feasibility Study

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Participating Agencies and Individuals

The following individuals or groups participated in the SR 164 Bypass Feasibility Study.

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City of Enumclaw:
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King County:
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Muckleshoot Tribe:
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Puget Sound Regional Council:
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Table of Contents

List of Exhibits

List of Appendices

Washington State
Department of Transportation

Chapter 1: Executive Summary

The State Route (SR) 164 Bypass Feasibility Study builds on the findings and recommendations of the *SR 164 Corridor Planning Study* (WSDOT, September 2009) to continue investigating potential improvements for the westernmost segment of SR 164 between Auburn Way and Dogwood Street. The intent of the study is to assess the benefits and challenges related to a new bypass connector for the SR 164 corridor within the study area and to highlight issues for future consideration.

The goals and objectives of this study have been identified to balance environmental, community, and transportation needs by developing recommendations for alignment concepts that are endorsed by the study's Corridor Working Group (CWG). The alignment options advanced should address existing and future operational deficiencies in a manner that is cost-effective, acceptable to communities along the corridor, and sensitive to environmental conditions and cultural resources.

View of SR 164 at M Street SE

The need for the SR 164 bypass roadway was discussed by the CWG during development of the SR 164 Corridor Planning Study, and included the possibility that a No-Action alternative could be the most viable path forward. A new bypass roadway, if built, would not be a new state route, but a local road because the bypass would provide a local connection and not regional connectivity like a state route provides.

The desire by the City of Auburn and the Muckleshoot Tribe for a bypass is related to reducing congestion through Auburn on SR 164 (Auburn Way S.), the lack of access to the Enumclaw Plateau, and the delay of emergency vehicle response due to congestion on SR 164. A bypass route could provide congestion relief during events at the White River Amphitheater and could also reduce delays at the SR 164/SR 18 interchange.

The intent of the technical work for this study was to compare two bypass options based on specific criteria and identify issues for future consideration. The two options studied show

the potential benefits such a new facility would provide, but they should not be considered the only alternatives or the preferred alternatives. The evaluations and comparisons made for this study were not intended to result in the recommendation of a single option for carrying forward. Additional alternatives and a preferred alternative would be developed as part of any future environmental review process.

The contents of this report summarize the methodologies used for this study, as well as its results and findings. This report describes the alignment options that were developed in terms of their respective potential to relieve traffic congestion, possible environmental constraints, design elements and features, and construction costs. This report documents and attempts to answer the following questions related to the bypass:

- Is a bypass possible?
- What are the options?
- What are the costs?
- What are the expected benefits?
- What unique challenges, if any, exist?
- What are the implications for other routes?

The report also highlights several alignment and design decisions that were made through interaction and discussions with stakeholders based on a variety of constraints and considerations. The findings of the evaluation and conclusions for this study are presented in Chapter 5.

1.1. Coordination and Scope of Study

The study area and specific options defined for analysis and evaluation were developed through coordination with various agencies and organizations included in the project's CWG. This group provided guidance and technical review in a collaborative format to ensure that the needs and objectives of the various stakeholders were communicated and understood throughout the study. Organizations and agencies represented in the CWG are as follows:

- City of Auburn

- City of Enumclaw
- King County
- Muckleshoot Tribe
- Puget Sound Regional Council (PSRC)
- Washington State Department of Transportation (WSDOT)

Early scope discussions within the project team (WSDOT and Consultant) and CWG led to a preliminary decision to investigate three potential options for this bypass study: a No-Bypass Option that would target improvements at the existing Auburn Way interchange, and two bypass options that would incorporate a new bypass roadway connecting SR 18 with SR 164.

The No-Bypass Option was removed from further consideration early in the study process as a result of previous traffic analysis work related to possible widening and reconfiguration improvements for the existing Auburn Way interchange (as part of the SR 164 Corridor Planning Study), as well as follow-up analysis by the project team that identified significant challenges associated with future improvements at the existing interchange. Planning-level analysis results for the 2030 No-Bypass alternative showed high levels of traffic congestion, especially at the SR 164/SR 18 interchange and at the M Street intersection during peak commute hours. This was due to increased traffic demands along the corridor and the physical constraints and right-of-way issues that prohibit further widening of the current interchange. Appendix B-1 includes details regarding delays and level-of-service (LOS) for key study intersections along SR 164.

Elements of the remaining two bypass options were developed incrementally by the project team, and feedback was solicited from and provided by the CWG. Design decisions relating to specific alignment paths, interchange location(s), and general design features were discussed in depth. The resulting outcomes of these discussions, in terms of the bypass elements, were incorporated into the two options. Ultimately the decisions made by the larger group resulted in project

definitions for two bypass options that were deemed reasonable for further analysis, design, and comparison.

1.2. Description of Bypass Alignment Options

Two alignment options, the Dogwood Option and the Grid Option, were developed and evaluated in this SR 164 Bypass Feasibility Study. These two options are slightly different than the options recommended for further analysis in the SR 164 Corridor Planning Study, despite similarities in terms of general connection points and capacity assumptions. As described in the corridor planning study, the CWG recommended Bypass Option #1 and Bypass Option #3 for further analysis as the locally preferred options. Option #1 represented the R Street Bypass and Option #3 was the Noble Court to R Street Bypass. These options are described in more detail in the next chapter of this document.

The SR 164 Bypass Feasibility Study builds on the findings and recommendations of the SR 164 Corridor Planning Study to continue investigating potential improvements for the westernmost segment of SR 164 between Auburn Way and Dogwood Street. The intent of the study is to assess the benefits and challenges related to a new bypass connector for the SR 164 corridor within the study area and to highlight issues for future consideration.

The primary difference between the options lies in where they would connect to SR 164 and how they would address peak-period traffic congestion and localized access and circulation. Neither option would fully capture the entire travel market along SR 164 since access to communities and neighborhoods varies depending on the alignment and associated intersection connections.

The Dogwood Option would include a new interchange at SR 18 approximately 1 mile east of the existing Auburn Way (SR 164) interchange. It also would include a bypass that connects the interchange to Dogwood Street at approximately 15th Street SE. From that point, this option would rely on Dogwood Street (improved) to connect the bypass with SR 164. Refer to Exhibit 1. for an overview map of the Dogwood Option.

Exhibit 1.1 Overview of Dogwood Option

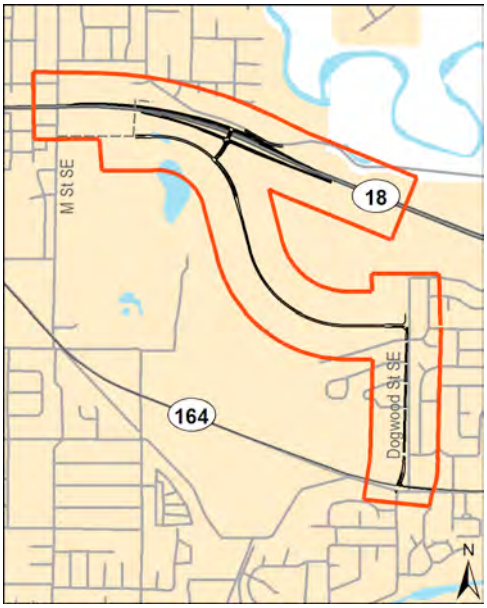
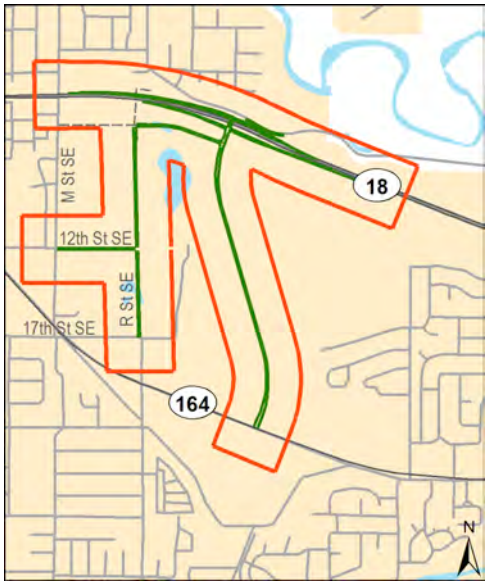


Exhibit 1.2 Overview of Grid Option



The Grid Option would include the same interchange at SR 18 (and in the same location) that would be provided in the Grid Option. This option would include a new two-lane bypass roadway connecting this interchange to SR 164 at Muckleshoot Plaza, and roadway extensions on R Street and 12th Street SE to provide a more complete grid network in the study area.

Exhibit 1. provides an overview of the Grid Option. Appendix A contains more detailed design plans, profiles, and typical sections for the two options.

1.3. Traffic Operations and Performance

In terms of general traffic performance, both options would provide relief from traffic congestion compared to the future year (2030) Baseline or the No-Action alternative. Nonetheless, the analysis findings indicate that the Dogwood Option would fare better with respect to circumventing the core congestion hotspots along SR 164 between Auburn Way and Dogwood Street due to the connection point being located farther east. Appendix B includes traffic operations and performance maps.

By comparison, the Grid Option would provide a greater level of network redundancy and would allow for additional travel routes for internal circulation within and through the study area. With regard to delays, LOS, and travel times, both options would provide similar performance benefits for traffic trying to reach SR 18 and would result in comparable improvements in traffic delay at the majority of the intersections evaluated. However, in terms of redistributing traffic across multiple routes and relieving critical high-congestion intersections such as SR 164 at M Street, the Grid Option would improve local conditions more effectively. Exhibit 1.3 on the following page summarizes the evaluation of traffic operations.

Exhibit 1.3 Summary of Future Year (2030) Traffic Operations Evaluation

Measure of Effectiveness	Dogwood Option	Grid Option
Level-of-Service	Majority of intersections would operate at LOS A, B, or C. Two intersections would operate at LOS E or F depending on the peak-hour period.	Majority of intersections would operate at LOS A, B, or C. One to three locations would operate at LOS E or F depending on the specific peak-hour period.
Travel Times	Travel times along this bypass route would be reduced by up to 45 to 50 percent compared to baseline conditions along SR 164. Travel times are generally similar to the Grid Option.	Travel times along this bypass route would be reduced by up to 40 to 45 percent compared to baseline conditions along SR 164. Travel times are generally similar to the Dogwood Option.

1.4. Environmental Effects or Constraints

A review of environmental effects and constraints for each option revealed only a small number of potential concerns, of which most were deemed modest in magnitude and breadth. A wide range of elements were reviewed and analyzed as part of the environmental review process (refer to Exhibit 1.4 and Appendix C: Environmental Review Summary Map). Key items targeted and identified as potential built environment constraints were primarily related to land use (residential properties), tribal lands, farmlands, environmental justice populations, and noise effects. Potential effects and/or constraints related to the natural environment for the two options were mainly concentrated in areas of erosion and liquefaction hazards, and potential effects to surface water and wetlands.

Exhibit 1.4 Environment Effects Summary

Resource	Dogwood Option	Grid Option
Built Environment	• 13.7 acres of residential/public use land to roadway use. Five residences would be acquired. • 12.2 acres of tribal land to roadway use. Five residential acquisitions could be owned by the Tribe. • 3.8 acres of farmland of statewide importance[1] and 8.9 acres of prime farmland[1] if irrigated (no acres if drained) to roadway use. • Roadway widening along Dogwood	• 22.8 acres of residential, office, and heavy industrial use land to roadway use. No residences would be acquired. • 14.1 acres of tribal land to roadway use. Land owned by Muckleshoot Tribe Realty Trust Services would be needed for acquisition. • 12.2 acres of farmland of statewide importance[1] and 3.0 acres of prime farmland[1] if irrigated (0.3

Resource	Dogwood Option	Grid Option
	Street SE would require adjustments to existing utilities, resulting in minor adverse effects. • Minority and low-income populations may be displaced as a result of the five residential acquisitions. All populations would experience similar project-related effects, such as increases in traffic noise. • White Lake Cemetery and residential areas at SR 18 and M Street SE and along Dogwood Street SE may experience an increase in traffic noise. • One site with a past Leaking Underground Storage Tank incident and a current Underground Storage Tank in operation is located within the design alignment along Auburn-Black Diamond Road, north of SR 18.	acres if drained) to roadway use. • A Puget Sound Energy substation is located adjacent to the alignment at the intersection of 12th Street SE and M Street SE. Future coordination with Puget Sound Energy would be needed to ensure that the alignment maintains necessary setbacks at the substation. Any adjustments to the existing utilities would result in minor adverse effects from relocation or temporary disruptions in service. • All populations would experience similar project-related effects, such as increases in traffic noise. Residential areas at SR 18 and M Street SE, west of M Street SE and 12th Street SE, and at the 17th Street SE and R Street SE intersection may experience an increase in traffic noise. • One site with a past Leaking Underground Storage Tank incident and a current Underground Storage Tank in operation is located within the design alignment along Auburn-Black Diamond Road, north of SR 18.
Natural Environment	• Protected species and/or habitat are not expected within the design alignment. • Surface water totaling 0.35 acre is located within the design alignment. • Wetlands totaling 0.17 acre are located within the design alignment. • The entire design alignment is located within a Critical Aquifer Recharge Area. A water quality report and stormwater collection, detention, and/or treatment facility would be required. • Erosion Hazard areas of 5.35 acres are located within the design alignment.	• Protected species and/or habitat are not expected within the design alignment. • Surface water totaling 0.62 acre is located within the design alignment. • Wetlands totaling 0.97 acre are located within the design alignment. • The entire design alignment is located within a Critical Aquifer Recharge Area. A water quality report and stormwater collection, detention, and/or treatment facility would be required. • Erosion Hazard areas of 6.61 acres are located within the design alignment.

Resource	Dogwood Option	Grid Option
	• Moderate Liquefaction Hazards areas of 16.9 acres are located within the design alignment. • No High Liquefaction Hazard areas are located within the design alignment.	• The design alignment includes 26.0 acres of Moderate Liquefaction Hazard areas. • High Liquefaction Hazard areas of 0.73 acre are located within the design alignment.

Note: Definitions of the different types of farmlands can be found in section 4.1.1.3 of this report.

1.5. Design Process and Cost Estimates

The design elements for each option were prepared based on guidance and standards contained within various design manuals, such as the *WSDOT Design Manual* (January 2009). The Grid Option, with its east-west and north-south roadway extensions beyond the bypass roadway, would require a greater amount of private and public land and property than the Dogwood Option (Exhibit 1.).

Exhibit 1.5 Right-of-Way Acquisition

	Dogwood Option	Grid Option
Right-of-Way		
Private Land Right-of-Way (Tribal)	12.2 acres	14.1 acres
Public Right-of-Way Needs (Dogwood Street)	1.5 acres	8.7 acres
Residential/Business Displacements		
Residential Units (Full Acquisitions)	5 (1.1 acres)	0
Businesses (Full Acquisitions)	0	1 (0.6 acre)

The potential construction costs for both options were based on existing year (2009) planning-level estimates that included a full range of elements, such as general capital costs (grading, pavement, curbs, etc), right-of-way, environmental mitigation, and various cost contingencies (Exhibit 1.6).

Exhibit 1.6 Construction Cost

	Dogwood Option	Grid Option[1]
New SR 18 Interchange	$48,150,000	$48,150,000
Bypass Roadway	$30,260,000	$27,840,000
Secondary Roadways	$0	$16,360,000
Total Bypass Option Cost	*$78,410,000*	*$92,350,000*
Total Bypass Cost Per Lane-Mile	*$37,931,000*	*$41,749,000*

[1]Potential substation relocation was not included in the construction cost of the Grid Option.

Because of the greater scale of the Grid Option in terms of actual paved area and the magnitude of roadway components, individual cost elements were generally 15 to 20 percent higher for that option than for those related to the Dogwood Option. Overall aggregated costs for the Grid Option were also 15 to 20 percent higher than for the Dogwood Option, primarily due to secondary roadways included in the Grid Option. The bypass and secondary roadways are shown in Exhibits 1.7 and 1.8. However, on a per lane-mile basis, the difference in cost between the two options is only 10 percent (approximately). Appendix D includes additional cost-estimate data and provides more details of the various cost elements.

Exhibit 1.7 Dogwood Option Bypass Roadway

Exhibit 1.8 Grid Option Bypass and Secondary Roadways

1.6. Cost-Effectiveness Comparison

While the outcomes of this study show that a new roadway connection between SR 164 and SR 18 may likely provide congestion-reduction benefits on SR 164 within the designated study segment, a high-level comparison of the overall effectiveness of each option was made using a general "project value" measure comprised of travel-time benefits and construction costs. This measure was specifically represented by the ratio of travel-time benefits and overall construction

cost. Additional details on cost-effectiveness are provided in Appendix E. Based on this general measure, the value of the Dogwood Option for providing congestion-reduction benefits would be marginally higher than that for the Grid Option.

1.7. Conclusions

The evaluation and comparison of the two bypass options revealed that — cost not withstanding — a new roadway connection between SR 164 and SR 18 would likely benefit the existing Auburn Way (SR 164) corridor within the defined study area in terms of peak-period congestion relief, mobility, and access. Additionally, the two options or bypass themes may prove to be reasonable candidates to carry forward in subsequent studies if and when additional environmental reviews and design efforts are conducted in the future. More study and discussion would need to occur as part of any future environmental review process. A summary evaluation matrix in Appendix F highlights the key benefits and differences between the general bypass alignments examined.

Based on the traffic analysis results, a new bypass facility between SR 164 and SR 18, such as those assumed under the Grid Option or Dogwood Option, would likely provide congestion-reduction benefits along SR 164 compared to a No-Action (baseline) alternative by shifting traffic demands away from the core SR 164 "hot-spot" locations within the study area (e.g., the on- and off-ramps at the SR 18/Auburn Way interchange). By drawing traffic to a new bypass connector, critical eastbound backups on SR 18 in the existing Auburn Way interchange area (particularly during the evening commute hours) may also be reduced. Further studies of the SR 18 corridor in this area that include the existing and new proposed interchanges would be needed to determine the magnitude of these mainline benefits.

The potential effects of the two options on the built and natural environments would likely be modest given the current environmental conditions in the study area. Despite the topographic challenges and steep slopes in certain portions of the study area, no major design issues were noted in the

conceptual design process that would restrict the construction of either bypass roadway facility.

With regard to project value, both options appear to show some level of feasibility in terms of providing congestion-reduction benefits at a reasonable cost. Specifically in the context of cost-effectiveness, where benefits are weighed against costs, the ratio of east-west point-to-point travel-time benefits to construction costs was used as one form of comparison for cursory differentiation. Using this measure, the Dogwood Option was found to potentially provide slightly greater value when compared to the Grid Option. If additional measures and/or inputs were incorporated to gauge the cost-effectiveness of the options (e.g. in a future environmental study), a more robust measure of project value could be captured.

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